Now, if the value thus found for R be greater than the cost C', the second bridge is more economical than the first; while, if it be less, the first bridge will be the more economical.'

The next economic consideration is that of depth of truss. Upon this subject much has been written, and many investigations have been made; the general conclusion being, that the depth should be from one-seventh to one-tenth of the span: some English writers say from one-tenth to one-fourteenth of the span; while only one, as far as the author knows, — Benjamin Baker, C.E., in his treatise on "Beams, Columns, and Arches," — makes it from one-fifth to one-seventh of the span.

Such investigations being purely mathematical, and involving the use of the differential calculus, are of little practical value, as they cannot take into account the numerous variables that ought to be considered. Not only do the stresses in a truss vary with the depth, but also the intensities of working-stress in the compression members. These, again, vary with the number of panels; and this variation is according to a law or laws altogether too complicated to be handled by the calculus. Again: the intensity of working-stress varies, or should vary, according to the position and importance of the member.

In view of the complexity of the question, and wishing to determine the most economic depths for Pratt and Whipple trusses, the author, about a year ago, undertook to solve the problem in a practical manner by assuming the most common clear roadway (sixteen feet), and figuring out a number of diagrams of stresses, and bills of materials. At first he considered that it would be necessary to calculate the total actual cost for every case, but upon further investigation found that it would be sufficient to figure out the sections and weights per lineal foot of the different members of one truss, multiply these by their respective lengths, and sum up the products, neglecting all consideration of details, because the differences in the weights of the latter balance each other. Thus, if the depth of a truss be increased by one foot, there would be a little increase in the weights of the lattice bars and rivets and a decrease in that of the pins and eye-bar heads. These may be taken as balancing each other, without making any appreciable error.